II. NOISE STANDARDS: AIRCRAFT TYPE AND AIRWORTHINESS CERTIFICATION 14 CFR PART 36

12. PART 36 - SUBPART A-GENERAL

a. Explanation

This SUBPART specifies the Applicability of 14CFR Part 36, Definitions of Terms Unique to 14CFR Part 36, Special Retroactive requirements, Airworthiness Compatibility requirements, Part Limitations, Information on References, and Acoustical Change Requirements

13. § 36.1 Applicability and Definitions

14. § 36.1 (a)

This part prescribes noise standards for the issue of the following certificates:

(1) Type certificates, and changes to those certificates, and standard airworthiness certificates, for subsonic transport category large airplanes and for subsonic jetpowered airplanes regardless of category.
(2) Type certificates and changes to those certificates, standard airworthiness certificates, and restricted category airworthiness certificates, for propeller-driven, small airplanes, and for propeller- driven, commuter category airplanes except those airplanes that are designed for "agricultural aircraft operations" (as defined in Sec. 137.3 of this chapter, as effective on January 1, 1966) or for dispersing fire fighting materials to which Sec. 36.1583 of this part does not apply.
(3) A type certificate and changes to that certificate, and standard airworthiness certificates, for Concorde airplanes.
(4) Type certificates, and changes to those certificates, for helicopters except those helicopters that are designated exclusively for "agricultural aircraft operations" (as defined in Sec. 137.3 of this chapter, as effective on January 1, 1966), for dispensing fire fighting materials, or for carrying external loads (as defined in Sec. 133.1(b) of this chapter, as effective on December 20, 1976).

a. Explanation

This Section specifies aircraft types and categories to which 14CFR Part 36 requirements are applicable as a condition for issuance of type certificates, changes to type certificates and airworthiness certificates .

b. Supplemental Information

(1) Applicability Date: Unless otherwise specified, the date to be used for determining the applicability of the appropriate 14CFR Part 36 standards for an aircraft type design is the date on which application for a type design was made. An application for type certification is effective for the time periods specified in 14CFR Part 21.

(2) Definitions of Terms: Section 4 of this Advisory Circular provides definitions for the following terms related to the aircraft types and categories within Items (1) – (4) of Section 36.1 (a).

Aircraft
Airplane
Helicopter
Airplane Categories (See Note 1)
- Acrobatic
- Commuter
- Normal

Large Aircraft
Small Aircraft
Propeller
Jet Airplanes
Turboprop Airplanes (See Note 3)

- Primary
- Restricted (See Note 2)
- Transport
- Utility

Helicopter Categories
- Normal
- Transport

Notes:

(1) Airplane Categories and Aircraft Classes: 14CFR Parts 1 and 21 recognize a distinction between Airplane Categories (e.g., acrobatic, commuter, normal, primary, restricted, transport and utility) and Aircraft Classes (e.g., Conventional Takeoff and Landing (CTOL), Vertical Takeoff and Landing (VTOL), Short Takeoff and Landing (STOL), Reduced Takeoff and Landing (RTOL),and Supersonic Transports (SST)). The noise certification requirements contained in 14CFR Part 36 are specified for several Airplane and Helicopter Categories but not for STOL, RTOL, SST (except for Concorde), or VTOL Aircraft Classes.

(2) Restricted Category Propeller -Driven Large Airplanes: Those propeller-driven large airplanes that have been type certificated in the restricted category (See 14CFR Part 21, Section 21.25) are not required to demonstrate compliance with the requirements of 14CFR Part 36. In the absence of 14CFR Part 36 applicability, an Environmental Assessment is required. (See FAA Order 8110.4A, paragraph 53 (d) for additional information.

(3) Turboprop Airplanes: Under 14 CFR Part 36, turboprop-powered airplanes are included under the 14CFR Part 36 requirements applicable to propeller-driven airplanes (i.e. subsonic transport category large airplanes, propeller-driven small airplanes, including acrobatic, normal, restricted, and transport categories; or propeller-driven commuter category airplanes.

15. § 36.1(b)

Each person who applies under 14CFR Part 21 of this chapter for a type of airworthiness certificate specified in this part must show compliance with the applicable requirements of this part, in addition to the applicable airworthiness requirements of this chapter.

a. Explanation

This Section specifies that an applicant must comply with appropriate airworthiness standards and 14CFR Part 36 as a part of the total aircraft certification process.

b. Supplemental Information

(1) Prior Airworthiness Compliance: An applicant's aircraft should comply with FAA airworthiness requirements before demonstrating compliance with 14CFR Part 36. This will reduce an applicant's risk of increased program schedules and noise certification costs due to re-test and re-analysis of configuration modifications that may affect aircraft noise levels.

(2) Aircraft Configuration for Noise Certification: An applicant's proposal for an aircraft configuration to be certified under the requirements of 14CFR Part 36 must include approved type design changes that would be required as a result of airworthiness standards testing and analysis, and which would result in acoustical changes (See Section 36.1 (c), Supplemental Information item number (2) for FAA criteria on when aircraft type design changes represent an acoustical change). If an applicant does not propose the appropriate aircraft configuration, additional noise certification testing and analysis may be required.

16. § 36.1(c).

Each person who applies under 14CFR Part 21 of this chapter for approval of an acoustical change described in Sec. 21.93(b) of this chapter must show that the aircraft complies with the applicable provisions of Sections. 36.7, 36.9, or 36.11 of this part in addition to the applicable airworthiness requirements of this chapter.

a. Explanation:

This section specifies 14CFR Part 36 requirements when " voluntary" changes are made to the type design of an aircraft under the provisions of 14CFR Part 21.

b. Supplemental Information:

(1) Acoustical Change: 14CFR Part 21, Section 21.93 (b) defines an aircraft " acoustical change " and specific aircraft configurations exempt from 14 CFR Part 36 requirements. The text of 14CFR Part 21, Section 21. 93(b) is as follows:

For the purpose of complying with Part 36 of this chapter, and except as provided in paragraphs (b)(2), (b)(3), and (b)(4) of this section, any voluntary change in the type design of an aircraft that may increase the noise levels of that aircraft is an "acoustical change" (in addition to being a minor or major change as classified in paragraph in paragraph (a) of this section) for the following aircraft:

(1) Transport category large airplanes.

(2) Turbojet powered airplanes (regardless of category). For airplanes to which this paragraph applies, "acoustical changes" do not include changes in type design that are limited to one of the following–

(I) Gear down flight with one or more retractable landing gear down during the entire flight, or
(ii) Spare engine and nacelle carriage external to the skin of the airplane (and return of the pylon or other external mount), or
(iii) Time-limited engine and/or nacelle changes, where the change in type design specifies that the airplane may not be operated for a period of more than 90 days unless compliance with the applicable acoustical change(2) provisions of Part 36 of this chapter is shown for that change in type design.

(3) Propeller driven commuter category and small airplanes in the primary, normal, utility, acrobatic, transport, and restricted categories, except for airplanes that are:

(I) Designated for "agricultural aircraft operations" (as defined in 34 137.3 of this chapter, effective January 1, 1966) to which Section 36.1583 of this chapter does not apply, or
(ii) Designated for dispensing fire fighting materials to which Section 36.1583 of this chapter does not apply, or
(iii) US registered, and that had flight time prior to January 1, 1955 or
(iv) Land configured aircraft reconfigured with floats or skis. This reconfiguration does not permit further exception from the requirements of this section upon any acoustical change(2) not enumerated in Section 21.93(b).

(4) Helicopters, (except for those helicopters that are designated exclusively for "agricultural aircraft operations", as defined in Section 137.2 of this chapter, as effective on January 1, 1966, for dispensing fire fighting materials, or for carrying external loads, as defined in § 133.1(b) of this chapter, as effective on December 20, 1976). For helicopters to which this paragraph applies, "acoustical changes" include the following type design changes:

(i) Any changes to, or removal of, a muffler or other component designed for noise control.
(ii) Any other design or configuration change (including a change in the operating limitations of the aircraft) that, based on FAA-approved analytical or test data, the Administrator determines may result in an increase in noise level."

(2) Acoustical Change Criteria: A voluntary change in the type design of an aircraft that may result in an increase in its certificated noise levels is defined as an " acoustical change." The numerical criteria used by the FAA in defining an acoustical change is a change in certificated flyover, lateral or approach noise levels of 0.10 EPNdB/dBA (if such changes are not formally tracked by an FAA approved method) or 0.30 EPNdB/dBA if an applicant has obtained an FAA approved plan to track and sum cumulative changes. This criteria implements the guidance in Section 1.4.3 of the appended ICAO Technical Manual to the extent that the FAA has found to be practicable, considering the need to limit the cumulative effects of multiple small changes.

(3) Voluntary Changes in Type Design: A voluntary change in the configuration of an aircraft is a change in the type design of that aircraft. Examples of voluntary changes in aircraft type design that may affect 14CFR Part 36 certificated noise levels are as follows:

- Increased engine power to improve aircraft performance;
- Maximum gross weight changes;
- Limitations on operational flap settings related to noise;
- Hardware revisions (e.g., vortex generators, flap configuration, wing tip stabilizers, wing tip fuel tanks, etc.);
- Engine modifications to improve engine performance, acceleration, deceleration, or surge margin protection;
- Addition of wing or body hardware to improve aerodynamics;
- External nacelle changes to improve air flow patterns;
- Engine inlet changes to improve ice protection;
- Reduction of engine blade tip clearances to improve inlet flow characteristics, and;
- Modifications to engine/nacelle acoustic treatments

(4) No Acoustical Changes: Type design changes that do not result in an " acoustical change" as defined in 14CFR Part 21, Section 21.93 (b) are referred to as "no acoustical changes" (NAC)

(5) NAC Cumulative Effects: When type design changes result in reduced noise levels, an applicant may elect not to provide the full 14CFR Part 36 substantiation, but provide FAA with data and/or information to substantiate a no acoustical change. However subsequent type design changes may require full 14CFR Part 36 certification because of cumulative acoustical effects. Example: An applicant proposes a configuration change which will reduce the noise levels by approximately 2.1 dB for the flyover noise measurement point, 1.1 dB for the lateral noise measurement point, and with no change in noise level at the approach noise measurement point. FAA accepts an evaluation that provides verification that the noise levels were reduced, and the applicant accepts the pre-change configuration certificated noise levels as published in the AFM to apply to this change in type design. The applicant may not make another type design change as a NAC that increases the flyover noise level and the lateral noise level without providing substantiation of the cumulative effects of this type design change on AFM noise certificated levels. Multiple type design changes must be evaluated as a combined single configuration change for the purposes of determining whether there is an acoustical change.

(6) Non-Standard Jet Airplane Configurations: Airplanes with type design changes as specified in 14CFR Part 21, Section 21.93 (b) (3) (I) and (ii) are not subject to compliance with 14CFR Part 36 requirements because such changes would occur only for in-frequent and/or non-standard operations..

(7) Time-Limited Changes: Time-Limited engine or nacelle changes on jet airplanes for periods of up to 90 days (as specified in 14CFR Part 21, Section 21.93 (b) (iii)) may be necessary for continued airplane

operation until maintenance can be performed on the original engines or nacelles that were changed. These changes must comply with applicable airworthiness standards and the maintenance, preventative maintenance, rebuilding and alteration inspection requirements of 14 CFR Part 43. Such changes do not require compliance with 14CFR Part 36 requirements even though they may result in an increase in airplane noise levels, relative to the certificated noise levels. FAA policy (See Federal Register Vol. 64, No. 225, Page 65655, dated November 23, 1999) permits the 90 day period allowed by 14CFR Part 21, Section 21.93 (b) (iii) to continue to be used after December 31, 1999, but only for maintenance-related purposes. It must not be used for meeting Stage 3 requirements due to lack of an adequate number of spare engines or nacelles, or insufficient number of engines or nacelles to operate a Stage 3 fleet at a given time. Section 21.93 (b) may only be used to intermix engines when maintenance is required and no conforming engine for the configuration is available.

(8) Special Purpose Aircraft: Type design changes to propeller-driven small airplanes and helicopters, do not need to comply with the provisions of 14CFR Part 36 when they are operated for special purposes as specified in 14CFR Part 21, Sections 21.93 (b) (3)(i-iv) and 21.93 (b) (4).

c. Procedure

(1) Applicant's Responsibility: Type design changes that may affect an aircraft's certificated noise levels must be identified by aircraft serial number and approved as temporary (complying with the 90 day rule) or permanent. Records of permanent type design changes must be documented in an AFM or RFM. The affected aircraft must comply with applicable airworthiness requirements, as well as the requirements of 14CFR Part 21, Section 21.93 (b) and 14CFR Part 36.

(2) FAA Responsibility: FAA is responsible to review applicant's proposals for type design changes and approve those configurations that comply with the requirements of 14CFR Part 36 and 14CFR Part 21, Section 21.93(b).

(3) No Acoustical Change Evaluation Procedures: FAA may accept evaluation procedures for no acoustical changes other than those prescribed in 14CFR Part 36. Component laboratory demonstrations, back—to-back noise comparisons from ground tests or flight tests of each configuration, acoustical analyses, etc may be acceptable. The results from these evaluations must be applicable to an aircraft's reference noise levels at 14CFR Part 36 reference noise measurement points.

17. § 36.1(d)

Each person who applies for the original issue of a standard airworthiness certificate for a transport category large airplane or for a jet airplane under 14CFR Part 21Sec. 21.183 must, regardless of date of application, show compliance with the following provisions of this part (including Appendix B):

(1) The provisions of this part in effect on December 1, 1969, for subsonic airplanes that have not had any flight time before--
(I) December 1, 1973, for airplanes with maximum weights greater than 75,000 pounds, except for airplanes that are powered by Pratt & Whitney Turbo Wasp JT3D series engines;
(ii) December 31, 1974, for airplanes with maximum weights greater than 75,000 pounds and that are powered by Pratt & Whitney Turbo Wasp JT3D series engines; and
(iii) December 31, 1974, for airplanes with maximum weights of 75,000 pounds and less.
(2) The provisions of this part in effect on October 13, 1977, including the stage 2 noise limits, for Concorde airplanes that have not had flight time before January 1, 1980.

b. Supplemental Information

(1) Airplane Certification Requirements: Prior to the original issuance of a standard airworthiness certificate (see 14CFR Part 21, Section 21.183) and regardless of the date of application for certification,

compliance with the regulatory requirements of 14CFR Part 36 (including Appendix B) is required for a transport category large airplane or a jet powered airplane, regardless of category . The following Table summarizes the requirements of Section 36.1 (d).

Maximum Airplane Weights	Airplane Types	Engine Configuration	Effective Date of Part 36	Compliance Date for Airplanes With Initial Flight Time on or After
75,000 pounds or less	Subsonic	All engines	December 1, 1969	December 31, 1974
Greater than 75,000	Subsonic	Without Pratt & Whitney JT3D engines	December 1, 1969	December 1, 1973
Greater than 75,000	Subsonic	With Pratt & Whitney JT3D engines	December 1, 1969	December 31, 1974
Concorde – all weights	Supersonic	All engines	October 13, 1977	January 1, 1980

(2) Airworthiness Certificates: An airworthiness certificate is issued for each airplane produced and is, a means of distinguishing (by date of issuance) airplanes within a production run that comply with the noise certification requirements of 14CFR Part 36.

(3) Other Airplanes: Airplane types not identified above are “grand-fathered” airplanes and are permitted to continue normal operations without showing compliance with the requirements of 14CFR Part 36. For example, the twin-engine propeller-driven Convair 580 or Douglas DC-3 airplanes that first logged flight time before December 31, 1974, did not have to comply with the noise provisions of 14CFR Part 36 and may have received a standard airworthiness certificate under the provisions of 14CFR Part 21, Section 21.183 or may have received a standard airworthiness certificate under the provisions of the regulations in effect at the time of certification without compliance with 14CFR Part 36.

c. Procedures:

(1) FAA’s Responsibility: An FAA ACO noise specialist must review proposed noise compliance demonstration plans in a standardized and consistent manner (including consistency between domestic and foreign certificating authority noise standards and compliance policies and procedures). The FAA noise specialist may need to consult with the appropriate Directorate Noise Certification Specialist (NCS) to determine appropriate procedures. The ACO specialist may also need to consult with other ACOs to determine previously approved airworthiness and noise certifications (such as STCs and NACs) that could affect his review process. If problems arise, the ACO noise specialist should consult with AEE through the NCS to clarify noise measurement and evaluation techniques and for approval of proposed equivalent procedures.

18. Section 36.1(e)

Each person who applies for the original issue of a standard airworthiness certificate under14CFR Part 21, Sec. 21.183, or for the original issue of a restricted category airworthiness certificate under 114CFR Part 21,Sec. 21.185, for propeller-driven, commuter category airplanes for a propeller-driven small airplane that has not had any flight time before January 1, 1980, must show compliance with the applicable provisions of this part. .

b. Supplemental Information

(1) Airworthiness Certificates: Compliance of an individual airplane with the requirements of 14CFR Part 36 is controlled by the issuance of airworthiness certificates, as prescribed in 14CFR Part 21, Section 21.183 or 21.185. An airworthiness certificate is issued for each aircraft and is a means of distinguishing (by date of issuance) airplanes that must comply with 14CFR Part 36 requirements.

(2) Commuter Category Airplanes: The airworthiness standards for commuter category airplanes became effective February 17, 1987, (under 14CFR Part 21, Amendment 21-59) and therefore there are no original issued commuter category airplanes with initial flight time before January 1, 1980. Consequently, all commuter category airplanes are required to show compliance with the noise certification requirements of 14CFR Part 36.

b. Procedures

(1) FAA's Responsibility: An FAA ACO noise specialist must review an applicant's noise compliance demonstration plan in a standardized and consistent manner (including consistency between domestic and foreign certificating authority noise standards and compliance policies and procedures). The FAA noise specialist may need to consult with the appropriate Directorate Noise Certification Specialist (NCS) and other ACOs to determine appropriate procedures and previously approved airworthiness and noise certifications (e.g. as STC'S and NAC'S) that could affect the specialist's review process. If noise certification problems arise, the ACO noise specialist may consult with AEE through the NCS to clarify noise certification requirements including approval of proposed equivalent procedures.

19. Section 36.1(f)

For the purpose of showing compliance with this part for transport category large airplanes and jet-powered airplanes regardless of category, the following terms have the following meanings:

(1) A "Stage 1 noise level" means a flyover, lateral or approach noise level greater than the Stage 2 noise limits prescribed in section B36.5 (b))of Appendix B of this part.
(2) A "Stage 1 airplane" means an airplane that has not been shown under this part to comply with the flyover, lateral, and approach noise levels required for Stage 2 or Stage 3 airplanes.
(3) A "Stage 2 noise level" means a noise level at or below the Stage 2 noise limits prescribed in section B36.5 (b) of Appendix B of this part but higher than the Stage 3 noise limits prescribed in section B36.5 (c) of Appendix B of this part.
(4) A "Stage 2 airplane" means an airplane that has been shown under this part to comply with Stage 2 noise levels prescribed in section B36.5 (b) of Appendix B of this part (including use of the applicable tradeoff provisions) and that does not comply with the requirements for a Stage 3 airplane.
(5) A "Stage 3 noise level" means a noise level at or below the Stage 3 noise limits prescribed in section B36.5 (c) of Appendix B of this part.
(6) A "Stage 3 airplane" means an airplane that has been shown under this part to comply with Stage 3 noise levels prescribed in sectionB36.5 (c) of Appendix B of this part (including use of the applicable tradeoff provisions).
(7) A "subsonic airplane" means an airplane for which the maximum operating limit speed, Mmo does not exceed a Mach number of 1.
(8) A "supersonic airplane" means an airplane for which the maximum operating limit speed, Mmo exceeds a Mach number of 1.

20. Section 36.1(g)

For the purpose of showing compliance with this part for transport category large airplanes and jet airplanes regardless of category, each airplane may not be identified as complying with more than one stage or configuration simultaneously.

a. Explanation

This Section specifies that each airplane configuration must be certificated to noise levels within the noise limits established for one stage only.

b. Supplemental Information

(1) In-flight Configuration Changes: In-flight changes in an airplane configuration (including changes in maximum gross weight) that might result in multiple certificated noise levels for a given noise measurement point or stage classification are not permitted. They are changes in the type design and therefore require a change in operating limitations. A change in maximum gross weight, requires an applicant to remove an airplane from service, and comply with the approval procedures of 14 CFR Part 43.5 and 43.7. The type design approval procedures under 14 CFR Part 21 must be followed if the change does not have prior certification approval.

21. Section 36.1(h)

For the purpose of showing compliance with this part, for helicopters in the primary, normal, transport, and restricted categories, the following terms have the specified meanings:

(1) Stage 1 noise level means a takeoff, flyover, or approach noise level greater than the Stage 2 noise limits prescribed in section H36.305 of Appendix H of this part, or a flyover noise level greater than the Stage 2 noise limits prescribed in section J36.305 of appendix J of this part.

(2) Stage 1 helicopter means a helicopter that has not been shown under this part to comply with the takeoff, flyover, and approach noise levels required for Stage 2 helicopters as prescribed in section H36.305 of Appendix H of this part, or a helicopter that has not been shown under this part to comply with the flyover noise level required for Stage 2 helicopters as prescribed in section J36.305 of Appendix J of this part.

(3) Stage 2 noise level means a takeoff, flyover, or approach noise level at or below the Stage 2 noise limits prescribed in section H36.305 of Appendix H of this part, or a flyover noise level at or below the Stage 2 limit prescribed in section J36.305 of Appendix J of this part.

(4) Stage 2 helicopter means a helicopter that has been shown under this part to comply with Stage 2 noise limits (including applicable tradeoffs) prescribed in section H36.305 of Appendix H of this part, or a helicopter that has been shown under this part to comply with the Stage 2 noise limit prescribed in section J36.305 of Appendix J of this part.

b. Supplemental Information

(1) The Stage 1 noise limits apply to all helicopters that applied for type certificates, or changes to type certificates prior to March 6, 1986.

(2) The Stage 2 noise levels apply to all helicopters that applied for a type certificate, or change to type certificate on or after March 6, 1986, with the following exception. Helicopters for which application for issuance off an original type certificate in the normal, transport or restricted category is made on or after March 6, 1986, and which the FAA finds to be the first civil version of a helicopter which was designed and constructed for, and accepted for operational use by an Armed Force of the U.S. or the U.S. Coast Guard on or before March 6, 196. It must be shown that the noise levels of the helicopter certificated under the provisions of Appendix H are no greater than Stage 2 levels plus 2 EPNdB at each measuring point. There is no corresponding provision under Appendix J. The tradeoff provision of H305 (b) may not be used to show compliance with Stage 2 levels plus 2 EPNdB, nor may they be used to increase any noise level beyond these limits. Subsequent civil versions (acoustic changes) must meet the Stage 2

requirements without the extra 2 EPNdB at each measuring point. The tradeoff provisions of H305 (b) may be used in showing stage 2 compliance for these subsequent versions.

(3) Helicopters Excepted: Helicopters that are designated exclusively for agricultural aircraft operations, as defined in 14CFR Part 137, Section 137.3 helicopter for dispensary fire fighting materials and helicopter for carrying external loads, as defined in 14CFR Part 133, Section 133.1 (b) are excluded from the noise certification requirements.

(4) Stage 1/Stage 2: A helicopter with a maximum take-off weight of 6000lbs (2,721kg) or less which fails to comply with the Stage 2 noise limit prescribed in appendix J (section J 36.305) may comply with the Stage 2 noise limit of Appendix H (section H 36.305) since the noise limit in SEL of Appendix J is more stringent by approximately 2 dB than the corresponding average of the three Appendix H noise limits in EPNL.

22. Section 36.2 Reserved

23. § 36.3 Compatibility with Airworthiness Requirements

It must be shown that the aircraft meets the airworthiness regulations constituting the type certification basis of the aircraft under all conditions in which compliance with this part is shown, and that all procedures used in complying with this part, and all procedures and information for the flight crew developed under this part, are consistent with the airworthiness regulations constituting the type certification basis of the aircraft.

a. Explanation

This Section specifies that a new aircraft type design or change to an existing type design must comply with the applicable airworthiness regulations (see paragraph 8a of this AC.) in addition to the requirements of 14CFR Part 36.

c. Procedures

(1) Applicant Responsibility: An applicant must identify those type design changes to the aircraft that could affect aircraft airworthiness. This action will reduce the applicant's risk of re-testing or re-evaluating the noise data for compliance with the requirements of 14CFR Part 36.

(2) Flight Test Procedures: Aircraft noise certification tests must be conducted using procedures and information for the flight crew that are consistent with airworthiness requirements. For example, noise tests must not be conducted with special landing flap settings, which are not approved.

24. § 36.5 Limitation of part

Pursuant to 49 U.S.C. 1431(b)(4), the noise levels in this part have been determined to be as low as is economically reasonable, technologically practicable, and appropriate to the type of aircraft to which they apply. No determination is made, under this part, that these noise levels are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

a. Explanation

This section specifies legal limitations regarding 14CFR Part 36.

b. Supplemetal Information

(1) Scope of 14CFR Part 36 Regulation: 14CFR Part 36 addresses the noise certification provisions of U.S. type certificated aircraft but does not include requirements for aircraft operations, such as is provided in

14CFR Part 91. Part 36 prescribes design standards for aircraft noise abatement purposes. While it does not regulate the operation of aircraft, demonstrated noise levels are achieved using procedures which can be duplicated practicably in normal operations by flight crews with safe reserves of thrust (power) and speed. Protection of the public from the adverse effects of aircraft noise, by controlling the noise source, is achieved by regulations consistent with the statutory obligation to consider whether the regulations are economically reasonable, technologically practical, and appropriate for the type of aircraft to which they apply.

25. § 36.6 Incorporations by reference

26. § 36.6(a)

General. This part prescribes certain standards and procedures that are not set forth in full text in the rule. Those standards and procedures are contained in published material which is reasonably available to the class of persons affected and has been approved for incorporation by reference by the Director of the Federal Register under 5 U.S.C. 552 (a) and 1 CFR Part 51.

27. § 36.6(b)

Incorporated matter. (1) Each publication, or part of a publication, which is referenced but not set forth in full-text in this part and which is identified in paragraph (c) of this section is hereby incorporated by reference and made a part of Part 36 of this chapter with the approval of the Director of the Federal Register. (2) Incorporated matter which is subject to subsequent change is incorporated by reference according to the specific reference and to the identification statement. Adoption of any subsequent change in incorporated matter is made under Part 11 of this chapter and 1 CFR Part 51.

a Explanation

This section specifies requirements for publications or documents to be “incorporated by reference” into 14CFR Part 36 and the process necessary when incorporated matter is subject to subsequent change.

b. Supplemental Information

(1) Change Process: 14CFR Part 11, Subpart B and C, specify requirements for initiating and processing requests for subsequent changes to Standards and Procedures “incorporated by reference”.

28. § 36.6(c)

Identification statement. The complete title or description, which identifies each published matter incorporated by reference in this part, is as follows:

(1) International Electrotechnical Commission (IEC) Publications.

(i) IEC Publication No. 179, entitled "Precision Sound Level Meters," dated 1973.

(ii) IEC Publication No. 225, entitled "Octave, Half-Octave, Third Octave Band Filters Intended for the Analysis of Sounds and Vibrations," dated 1966.

(iii) IEC Publication No. 651, entitled "Sound Level Meters," first edition, dated 1979.

(iv) IEC Publication No. 561, entitled "Electro-acoustical Measuring Equipment for Aircraft Noise Certification," first edition, dated 1976.

(v) IEC Publication No. 804, entitled "Integrating-averaging Sound Level Meters," first edition, dated 1985.

(vi) IEC Publication 61094-3, entitled "measurement microphones- Part 3: Primary Method for Free-Field Calibration of Laboratory Standard Microphones by the Reciprocity Technique", first edition, dated 1995
(vii) IEC Publication 61094-4, entitled "Measurement Microphones- Part 4: Specifications for Working Standard Microphones", first edition, dated 1995
(viii) IEC Publication 61260, entitled "Electroacoustics-Octave-Band and Fractional-Octave-Band filters", first edition, dated 1995
(ix) IEC Publication 61265,: entitled "Instruments for Measurement of Aircraft Noise-Performance Requirements for Systems to Measure One-Third-Octave-Band Sound Pressure Levels in Noise Certification of Transport-Category Aeroplanes", first edition, dated 1995
(x) IEC Publication 60942, entitled "Electroacoustics- Sound Calibrators", second edition, dated 1997

(2) Society of Automotive Engineers (SAE) Publications. (i) SAE ARP 866A, entitled "Standard Values at Atmospheric Absorption as a Function of Temperature and Humidity for Use in Evaluating Aircraft Flyover Noise," dated March 15, 1975.

a. Explanation

This section specifies standards and procedures that are required for noise measurement and evaluation of various aircraft and are incorporated by reference into 14CFR Part 36.

b. Supplemental Information

Other Publications: Other publications (e.g., those listed below) and in the appended ICAO Technical Manual may be useful to an applicant during implementation of an aircraft noise certification process. Applicant proposals for use of standards and procedures found in these publications must be included in an applicant's noise compliance demonstration plan and approved by FAA. An applicant should also contact an ACO Specialist prior to submittal of a noise compliance demonstration plan to FAA to determine whether there are new standards and procedures that are applicable to his particular aircraft noise certification process.

(i) ESDU Item 80038, Amendment B: The Correction of Measured Noise Spectra for the Effects of Ground Reflection, dated 1981
(ii) IEC Publication 50(801): International Electrotechnical Vocabulary (IEV) - Chapter 801: Acoustics and Electroacoustics, dated 1994,
(iii) ISO Publication 266: Acoustics - Preferred Frequencies of Measurements, dated 1975,
(iv) OIML Publication: Vocabulary of Legal Metrology - Fundamental Terms, dated 1978

29. § 36.6(d)

Availability for purchase. Published material incorporated by reference in this part may be purchased at the price established by the publisher or distributor at the following mailing addresses:

(1) IEC publications,
(i) International Electrotechnical Commission,3, rue de Varembe, Case postale 131, 1211 Geneva 20, Switzerland
(ii) American National Standard Institute, 11 West 42nd Street, New York City, New York 10036 (Electronic mail address: INFO@ANSI.org).
(2) SAE publications. Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrentown, Pennsylvania 15096.(Electronic mail address: SAE@SAE.org)

b. Supplemental Information

(1) Addresses of Other Organizations: Addresses for other organizations where technical standards, references and publications that relate to aircraft noise certification are as follows:

(i) Bureau International de Métrologie Légale
11, rue Turgot
75009 Paris, France

(ii) Engineering Science Data Unit International, Ltd.
251-259 Regent Street
London, England
W1R 7AD, United Kingdom

(iii) International Civil Aviation Organization
999 University Street
Montreal, Quebec
Canada H3C 5H7
(Electronic mail address: Sales_unit@ICAO.org)

(iv) National Institute of Standards and Technology
Building 101, Room A903
Gaithersburg, Maryland 20899
(Electronic mail address: Inquiries@NIST.gov)

30. § 36.6(e)

Availability for inspection. A copy of each publication incorporated by reference in this part is available for public inspection at the following locations:

(1) FAA Office of the Chief Counsel, Rules Docket, Room 916, Federal Aviation Administration Headquarters Building, 800 Independence Avenue, SW., Washington, D.C.

(2) Department of Transportation, Branch Library, Room 930, Federal Aviation Administration Headquarters Building, 800 Independence Avenue, SW., Washington, D.C.

(3) The respective Region Headquarters of the Federal Aviation Administration as follows:

(i) New England Region Headquarters, 12 New England Executive Park, Burlington, Massachusetts 01803.

(ii) Eastern Region Headquarters, Federal Building, John F. Kennedy (JFK) International Airport, Jamaica, New York 11430.

(iii) Southern Region Headquarters, 1701 Columbia Avenue, College Park, Georgia, 30337 .

(iv) Great Lakes Region Headquarters, O'Hare Lake Office Center, 2300 East Devon Avenue, Des Plaines, Illinois 60018.

(v) Central Region Headquarters, Federal Building, 601 East 12th Street, Kansas City Missouri 64106.

(vi) Southwest Region Headquarters,2601 Meacham Boulevard , Fort Worth, Texas 76137-4298.

(vii)Northwest Mountain Region Headquarters 1601 Lind Avenue, Southwest, Renton, , Washington 98055.

(viii) Western-Pacific Region Headquarters 15000 Aviation Boulevard, Hawthorne, California 92007.

(ix) Alaskan Region Headquarters, 222 West 7th Avenue , # 14 , Anchorage, Alaska 99513.

(x) European Office Headquarters, 15, Rue de la Loi (3rd Floor), B-1040 Brussels, Belgium.

b. Supplemental Information

Other DOT/FAA Addresses : Current addresses of U.S, Department of Transportation and FAA organizations (and Specialists) that might provide assistance to an applicant are as follows:

(1) FAA/DOT Offices, Washington, D.C.:

(i) FAA Office of Environment and Energy (AEE-1) Federal Aviation Administration Headquarters Building, Room 900W,
800 Independence Avenue, SW.
Washington D.C. 20591

(ii) FAA Office of the Chief Council (AGC-1)
Federal Aviation Administration Headquarters Building, Room 900E
800 Independence Avenue, SW.
Washington D.C. 20591

(iii) U.S. Department of Transportation
Branch Library
Federal Aviation Administration Headquarters Building, Room 930
800 Independence Avenue, SW.
Washington D.C. 20591

(2) FAA Noise Certification Specialists:

(i) Rotorcraft Noise Certification Specialist (ASW-100PO)
Federal Aviation Administration
Rotorcraft Directorate
2601 Meacham Boulevard
Fort Worth, Texas, 76137-4298

(II) Small Airplane Noise Certification Specialist (ACE-111)
Federal Aviation Administration
Federal Building
601 East 12th Street
Kansas City, Missouri, 64106

(iii) Transport Airplane Noise Certification Specialist (ANM-112)
Federal Aviation Administration
Transport Airplane Directorate
1601 Lind Avenue Southwest
Renton, Washington 98055-4056

Note: These Specialists are located in their respective Directorates.

(3) FAA Directorates:

(i) Engine and Propeller Directorate (ANE-100)
Federal Aviation Administration
12 New England Executive Park
Burlington, Massachusetts 01803-5299

(ii) Rotorcraft Directorate (ASW-100)
Federal Aviation Administration
2601 Meacham Boulevard

Fort Worth, Texas 76137

(iii) Small Airplane Directorate (ACE-100)
Federal Aviation Administration
1201 Walnut Street
Kansas City, Missouri 64106

(iv) Transport Airplane Directorate (ANM-100)
Federal Aviation Administration
1601 Lind Avenue Southwest
Renton, Washington 98055 -4056

Note: These Directorates are involved in aircraft certification and continued airworthiness activities.

(4) FAA Regional Headquarters:

(i) Alaskan Region Headquarters (AAL-1)
Federal Aviation Administration
222 West 7th Avenue, # 14
Anchorage, Alaska 99513-7587

(ii) Central Region Headquarters (ACE-1)
Federal Aviation Administration
601 East 12th Street
Federal Building
Kansas City, Missouri 64106

(iii) Eastern Region Headquarters (AEA-1)
Federal Aviation Administration
JFK International Airport
Fitzgerald Federal Building
Jamaica, New York 11430

(iv) Great Lakes Region Headquarters (AGL-1)
Federal Aviation Administration
O'Hare Lake Office Center
2300 East Devon Avenue
Des Plaines, Illinois 60018_4686

(v) New England Region Headquarters (ANE-1)
Federal Aviation Administration
12 New England Executive Park
Burlington, Massachusetts 01803-5299

(vi) Northwest Mountain Region Headquarters (ANM-1)
Federal Aviation Administration
1601 Lind Avenue Southwest
Renton, Washington 98055-4056

(vii) Southern Region Headquarters (ASO-1)
Federal Aviation Administration
1701 Columbia Avenue
College Park, Georgia 30337

(viii) Southwest Region Headquarters (ASW-1)

Federal Aviation Administration
2601 Meacham Boulevard
Fort Worth, Texas 76137- 4298

(ix) Western-Pacific Region Headquarters (AWP-1)
Federal Aviation Administration
PO Box 92007
Worldway Postal Center
Los Angeles, Ca, 90009

(5) FAA Aircraft Certification Offices (ACO):

(i) Anchorage Aircraft Certification Office (ACE-115N)
Federal Aviation Administration
222 West 8th Avenue
Anchorage, Alaska 99513-7587

(ii) Atlanta Aircraft Certification Office (ACE-115A)
Federal Aviation Administration
One Crown Center
1895 Phoenix Boulevard, Suite 450
Atlanta, Georgia 30349

(iii) Boston Aircraft Certification Office (ANE-150)
Federal Aviation Administration
12 New England Executive Park
Burlington, Massachusetts 01803-5299

(iv) Brussels Aircraft Certification Staff (AEU-100)
Federal Aviation Administration
c/o American Embassy
15 rue de la Loi (1st Floor)
B-1040
Brussels, Belgium

(mailing address: Federal Aviation Administration (AEU-100)
c/o American Embassy
PSC 82, Box 002
APO AE 09724)

(v) Chicago Aircraft Certification Office (ACE-115C)
Federal Aviation Administration
2350 East Devon, Room 332
Des Plaines, Illinois 60018

(mailing address: Chicago Aircraft Certification Office (ACE-115C)
Federal Aviation Administration
2300 East Devon
Chicago, Illinois 60018)

(vi) Denver Aircraft Certification Office (ANM-100D)
Federal Aviation Administration
Technical Operations Center
26805 East 68th Avenue, Room 214
Denver, Colorado 80249

(vii) Engine Certification Office (ANE-140)
Federal Aviation Administration
12 New England Executive Park
Burlington, Massachusetts 01803-5299

(viii) Fort Worth Aircraft Certification Office (ASW-150)
Federal Aviation Administration
2601 Meacham Boulevard
Fort Worth, Texas 76137-4298

(ix) Fort Worth Rotorcraft Certification Office (ASW-170)
Federal Aviation Administration
2601 Meacham Boulevard
Fort Worth, Texas 76137-4298

(x) Fort Worth Special Certification Office (ASW-190)
Federal Aviation Administration
2601 Meacham Boulevard
Fort Worth, Texas 76137-4298

(xi) Los Angeles Aircraft Certification Office (ANM-100L)
Federal Aviation Administration
3960 Paramount Boulevard
Lakewood, California 90712-4137

(xii) New York Aircraft Certification Office (ANE-170)
Federal Aviation Administration
10 Fifth Street, 3rd Floor
Valley Stream, New York 11581-1200

(xiii) Seattle Aircraft Certification Office (ANM-100S)
Federal Aviation Administration
1601 Lind Avenue Southwest
Renton, Washington 98055-4056

(xiv) Wichita Aircraft Certification Office (ACE-115W)
Federal Aviation Administration
Mid-Continent Airport
FAA Building, Room 100
1801 Airport Road
Wichita, Kansas 67209

Note: An applicant must coordinate airworthiness and noise certification activities at an appropriate ACO Office. Direction on the appropriate ACO Office may be obtained from FAA Directorate, Regional or Certification Specialist Offices.

31. §§ 36.7 Acoustical Change: Transport Category Large Airplanes and Turbojet Powered Airplanes

32. § 36.7(a)

Applicability. This section applies to all transport category large airplanes and jet airplanes for which an acoustical change approval is applied for under Sec. 21.93(b) of this chapter.

33. § 36.7(b)

General requirements. Except as otherwise specifically provided, for each airplane covered by this section, the acoustical change approval requirements are as follows:

(1) In showing compliance, noise levels must be measured and evaluated in accordance with the applicable procedures and conditions prescribed in Appendix A of this part.
(2) Compliance with the noise limits prescribed in sectionBC36.5 of Appendix B must be shown in accordance with the applicable provisions of section B36.7 and B36.8 of Appendix B of this part.

a. Explanation

This section specifies requirements for approval of acoustical changes applied for under 14CFR Part 21, Section 21.93 (b).

34. § 36.7(c)

Stage 1 airplanes. For each Stage 1 airplane prior to the change in type design, in addition to the provisions of paragraph (b) of this section, the following apply:

(1) If an airplane is a Stage 1 airplane prior to the change in type design, it may not, after the change in type design, exceed the noise levels created prior to the change in type design. The tradeoff provisions of section(B36.6) of Appendix B of this part may not be used to increase the Stage 1 noise levels, unless the aircraft qualifies as a Stage 2 airplane.
(2) In addition, for an airplane for which application is made after September 17, 1971--
(i) There may be no reduction in power or thrust below the highest airworthiness approved power or thrust, during the tests conducted before and after the change in type design; and
(ii) During the takeoff and sideline noise tests conducted before the change in type design, the quietest airworthiness approved configuration available for the highest approved takeoff weight must be used.

b. Supplemental Information

(1) Quietest Airworthiness Approved Configuration: This requirement was established to ensure that an applicant may not use, as a baseline for acoustical change assessment, flyover or lateral aircraft noise levels not representative of the airplane model fleet. FAA policy does not require noise measurements and evaluations to determine the quietest approved airworthiness configuration for purposes of assessing an acoustic change or no acoustical change between originally certificated and derivative airplane configurations. Rather, these evaluations must be consistent with respect to each other.

35. § 36.7(d)

Stage 2 airplanes. If an airplane is a Stage 2 airplane prior to the change in type design, the following apply, in addition to the provisions of paragraph (b) of this section:

(1) Airplanes with high bypass ratio jet engines. For an airplane that has jet engines with a bypass ratio of 2 or more before a change in type design--
(I) The airplane, after the change in type design, may not exceed either (A) each Stage 3 noise limit by more than 3 EPNdB, or (B) each Stage 2 noise limit, whichever is lower:

(ii) The tradeoff provisions of section B36.6 of Appendix B of this part may be used in determining compliance under this paragraph with respect to the Stage 2 noise limit or to the Stage 3 plus 3 EPNdB noise limits, as applicable; and

(iii) During the takeoff and sideline noise test conducted before the change in type design, the quietest airworthiness approved configuration available for the highest approved takeoff weight must be used.

(2) Airplanes that do not have high bypass ratio jet engines. For an airplane that does not have jet engines with a bypass ratio of 2 or more before a change in type design-

(i) The airplane may not be a Stage 1 airplane after the change in type design; and

(ii) During the takeoff and sideline noise tests conducted before the change in type design, the quietest airworthiness approved configuration available for the highest approved takeoff weight must be used. .

b. Supplemental Information

(1) Quietest Airworthiness Approved Configuration: This requirement was established to show that an acoustical change resulting from an approved type design change could be determined consistently. In practice, the FAA policy has not required an applicant to determine, through noise measurements and evaluation, the quietest airworthiness approved configuration at the flyover or lateral noise measurement points. Rather, the FAA has required consistent evaluations between derivative and originally certificated configurations. For example, an applicant might choose an approved takeoff flap setting of 5 degrees. Later a type design change may be requested that would increase the flyover and lateral noise levels (an acoustical change). FAA may not require the applicant to measure and evaluate all airworthiness approved takeoff flap settings (e.g., 0, 1, 2, 5, 10 degrees) to determine the quietest configuration, but may, in this example, require appropriate evaluations for a flap setting of 5degrees.

36. § 36.7(e)

Stage 3 airplanes. If an airplane is a Stage 3 airplane prior to the change in type design, the following apply, in addition to the provisions of paragraph (b) of this section:

(1) If compliance with Stage 3 noise levels is not required before the change in type design, the airplane must--

(I) Be a Stage 2 airplane after the change in type design and compliance must be shown under the provisions of paragraph (d)(1) or (d)(2) of this section, as appropriate; or

(ii) Remain a Stage 3 airplane after the change in type design. Compliance must be shown under the provisions of paragraph (e)(2) of this section.

(2) If compliance with Stage 3 noise levels is required before the change in type design, the airplane must be a Stage 3 airplane after the change in type design.

(3) Applications on or after [August 14, 1989.] The airplane must remain a Stage 3 airplane after the change in type design.

b. Supplemental Information

(1) Dual-Stage Certificated Airplanes: Some airplane models have been certificated to Stage 2 for one configuration and to Stage 3 for another configuration (e.g., airplane takeoff flap setting or maximum allowable gross weights). These airplanes are classified as “Dual-Stage Certificated” airplanes. Dual-Stage certification is applicable only to those individual airplanes for which application for Stage 3 certification was made before August 14, 1989.

37. § 36.9 Acoustical change: Propeller-driven small airplanes and propeller-driven commuter category airplanes [To be completed later]

38. § 36.9(a) [To be completed later]

39. § 36.9(b) [To be completed later]

40. § 36.11 Acoustical Change: Helicopters

This section applies to all helicopters in the primary, normal, transport, and restricted categories for which an acoustical change approval is applied for under Sec. 21.93(b) of this chapter on or after March 6, 1986. Compliance with the requirements of this section must be demonstrated under appendix H of this part, or, for helicopters having a maximum certificated takeoff weight of not more than 6,000 pounds, compliance with this section may be demonstrated under Appendix J of this part.

b. Supplementary Information

(1) Modification Excluded: Helicopters modified by installation or removal of external equipment are excluded from 14CFR Part 36 noise certification requirements. For this purpose external equipment means any instrument, mechanism, part, apparatus, appurtenance, or accessory that is attached to or extends from the helicopter exterior but is not used nor is intended to be used in operating or controlling a helicopter in flight and is not part of an airframe or engine.

An "acoustical change" does not include:

a) Addition or removal of external equipment;
b) Changes in the airframe made to accommodate the addition or removal to facilitate the use of external equipment, to provide for an external load attaching means, to facilitate the safe operation of the helicopter with external equipment mounted to, or external loads carried by, the helicopter;
c) Reconfiguration of the helicopter by the addition or removal of floats and skis;
d) Flight with one or more doors and/or windows removed or in an open position; or
e) Any changes in the operational limitations on the helicopter as a consequence of the addition or removal of external equipment, floats, and skis, or flight operations with doors and/or windows removed or in an open position.

41. § 36.11(a)

General requirements. Except as otherwise provided, for helicopters covered by this section, the acoustical change(2) approval requirements are as follows:

(1) In showing compliance with the requirements of appendix H of this part, noise levels must be measured, evaluated, and calculated in accordance with the applicable procedures and conditions prescribed in parts B and C of appendix H of this part. For helicopters having a maximum certificated takeoff weight of not more than 6,000 pounds that alternatively demonstrate compliance under appendix J of this part, the flyover noise level prescribed in appendix J of this part must be measured, evaluated, and calculated in accordance with the applicable procedures and conditions prescribed in parts B and C of appendix J of this part.

(2) Compliance with the noise limits prescribed in section H36.305 of appendix H of this part must be shown in accordance with the applicable provisions of part D of appendix H of this part. For those helicopters that demonstrate compliance with the requirements of appendix J of this part, compliance with the noise levels prescribed in section J36.305 of appendix J of this part must be shown in accordance with the applicable provisions of part D of appendix J of this part.

b. Supplementary Information

(1) Equivalent Procedures: Subject to prior approval by the FAA, equivalent procedures may be used to measure, evaluate and calculate the appropriate noise levels. Some commonly used equivalent procedures are outlined in Appendix H and Appendix J.

(2) Noise Level Tradeoffs: Tradeoff between the corrected noise levels for flyover, takeoff and approach defined in H36.305(b) maybe used to show compliance with the limits of Appendix H. Since Appendix J only includes a flyover procedure, no tradeoff is possible.

c. Procedures

(1) Compliance: The procedure used to show compliance under Appendix H and Appendix J must follow the applicable parts of the regulation. Compliance with the noise limits prescribed in section H36.305 of Appendix H or J36.305 of Appendix J must be shown.

42. § 36.11(b)

Stage 1 helicopters. Except as provided in Sec. 36.805(c), for each Stage 1 helicopter prior to a change in type design, the helicopter noise levels may not, after a change in type design, exceed the noise levels specified in section H36.305 (a)(1) of appendix H of this part where the demonstration of compliance is under appendix H of this part. The tradeoff provisions under section H36.305 (b) of appendix H of this part may not be used to increase any Stage 1 noise level beyond these limits. If an applicant chooses to demonstrate compliance under appendix J of this part, for each Stage 1 helicopter prior to a change in type design, the helicopter noise levels may not, after a change in type design, exceed the Stage 2 noise levels specified in section J36.305 (a) of Appendix J of this part.

b. Supplementary Information

(1) The noise limits associated with a Stage 1 helicopter certificated under Appendix H after a change in type design are dependent on the noise levels of the original Stage 1 helicopter. Unless the Stage 1 helicopter after the change meets the Stage 2 limits, or Stage 2+ 2 EPNdB levels at each measuring point, it will be necessary to show that the helicopter has no increase in the noise at any levels of the measuring points. This will require determination of the noise levels associated with the original Stage 1 helicopters using Appendix H procedures. If this is not possible an FAA agreed procedure will be required to be used.

43. § 36.11(c)

Stage 2 helicopters. For each helicopter that is Stage 2 prior to a change in type design, the helicopter must be a Stage 2 helicopter after a change in type design

b. Supplementary Information

(1) Helicopter under 6000 lbs (2727 kg): If after a change in design a helicopter previously certificated under Appendix J, fails to meet the Appendix J Stage 2 limits prescribed in J36.306 the applicant may recertificate the helicopter under Appendix H and show compliance will the Appendix H Stage 2 limits specified in H36.305(c)(1).

(2) Noise Levels: Section 36.11 (I) requirements apply to helicopters certificated under both Appendix H and Appendix J.

44. -50 [RESERVED]

III. SUBPART B—SUBSONIC TRANSPORT CATEGORY LARGE AIRPLANES AND JET AIRPLANES

a. Explanation

Subpart B specifies 14CFR Part 36 requirements for measurement and evaluation of airplane noise certification data, determination of reference noise levels, and maximum noise levels for Stage 1, Stage 2 and Stage 3 airplanes.

51. § 36.101 Noise Measurement and Evaluation

For transport category large airplanes and jet airplanes the noise generated by the airplane must be measured under Appendix A of this part or under an approved equivalent procedure

a. Explanation

Appendix B, Section B36.1 requires that airplane flyover, lateral and approach noise levels must be measured and evaluated as prescribed by Appendix A or by an approved equivalent procedure.

b. Supplemental Information

(1) Appendix A: Appendix A prescribes methodologies to conduct noise certification tests, measure noise data, and calculate airplane reference noise levels for comparison with maximum noise levels specified in Appendix B (See Note 1). Specific requirements include:

a. Specifications of various physical and environmental conditions under which airplane noise certification measurements are permitted. These conditions are related to a noise test site, wind velocity/direction and atmospheric sound attenuation.
b. Procedures for measurement of atmospheric parameters.
c. Methods for synchronization of airplane position and performance measurements with noise measurements.
d. Specifications for noise certification measurement and analysis systems (See Note 2).
e. Methods to calculate atmospheric sound attenuation coefficients and Effective Perceived Noise Level (in units of EPNdB).
f. Methods for adjustment of measured flight test data to reference conditions.
g. Nomenclature for symbols and units.
h. Specification of data to be reported to FAA.

Notes:

(1) With the exception of Section A36.3, Appendix A text closely approximates that of Appendix 2 of Annex 16 Volume 1, Amendment 6, Effective 19 July, 1999 and Appendix A of JAR 36 Issued 23 may, 1997. Section A36.3 requirements were recently developed by Working Group 1 Jet 8 Task Force of the ICAO Committee on Aviation Environmental Protection (CAEP). These requirements are expected to be incorporated into the next approved Amendment of ICAO Annex 16, Volume 1, and JAR 36. Section 7 of the Appended ICAO Technical Manual is superceded by Appendix A and is expected to be deleted from the ICAO Technical Manual when Annex 16 and JAR 36 are amended.

(2) Some provisions of Appendix A may also apply to the noise certification of helicopters as prescribed in Appendix H of FAR Part 36.

(2) Equivalent Procedures: Equivalent Procedures, as referred to in this AC, are aircraft measurement, flight test, analytical or evaluation methods that differ from the methods specified in the text of 14CFR Part 36 Appendices A and B, but yield essentially the same noise levels. Applicants must submit proposed

equivalent procedures to the FAA for approval. Some equivalent procedures may be the same for all types of aircraft but others may be unique to different types of aircraft or be proprietary to an aircraft manufacturer.

The appended ICAO Technical Manual provides general guidance on equivalent procedures in Section 1. Section 2 of the ICAO TM contains technical guidance on equivalent and analytical procedures for subsonic jet powered airplanes, sections 3 and 4 contain similar guidance for propeller driven airplanes, and section 5 for helicopters. Technical guidance on evaluation procedures is given in Section 6. The guidance provided by the ICAO Technical Manual on equivalent procedures that have been approved in the past neither implies that they are the only acceptable ones nor that they are limited for current noise certification applications nor that FAA has approved their application for any current or future aircraft noise certification actions (See Subpart O, Sections 1501 and 1581, Supplemental Information, for more specific information regarding FAA's approval process for equivalent procedures).

Notes:

(1) Flight test equivalent procedures have been used to acquire a sufficient number of noise measurements at various engine thrusts (powers) to develop generalized noise databases often referred to as Noise-Power-Distance (NPD) PLOTS. (See Section 2.1.2 and 3.1.2 of the Appended ICAO Technical Manual). These NPD plots may be particularly useful for applicants to determine reference noise levels for derived versions of an aircraft type.

(2) Equivalent procedures involving the use of static engine noise test data projected to flight conditions to account for changes to an airplane engine configuration or to an installation of an acoustically similar engine on the same airframe have been used for comparison to measured flight noise levels of the airplane with engines as originally certified. This type of data has also been used to demonstrate "no acoustical change" resulting from minor modifications to engine components. (See Section 2.3 and 3.3 of the Appended ICAO Technical Manual).

(3) Equivalent procedures involving analytical methods have been used to determine changes in airplane certificated noise levels resulting from thrust (power) reduction, modifications of airplane maximum takeoff or landing weights, engine thrust rating changes, engine or nacelle configuration or acoustic treatment changes, and airplane performance changes resulting from airframe design changes. (See Sections 2.2 and3.2 of the Appended ICAO Technical Manual).

c. Procedures

(1) Applicant's Responsibility: Applicants must prepare noise compliance demonstration plans for FAA approval that include proposed methods for compliance with the requirements of Appendix B (Section B36.1). Equivalent procedure proposals in these plans must include substantiation of their technical validity and feasibility of application to the airplane type for which noise certification is requested. (See Subpart O Section 1501, Supplemental Information, for noise compliance demonstration plan documentation requirements.

(2) FAA's Responsibility: FAA is responsible for reviewing applicants noise compliance demonstration plans and approving plans after they are found to be in compliance with 14CFR Part 36 requirements, including FAA policies regarding interpretation of these requirements and equivalent procedures (See Subpart O, Sections 1501 and 1581, Supplemental Information, regarding FAA review and approval processes).

52. § 36.103 Noise Limits

53. § 36.103(a)

For subsonic transport category large airplanes and subsonic jet airplanes compliance with this section must be shown with noise levels measured and evaluated as prescribed in Appendix A of this part* and *demonstrated at the measuring points, and in accordance with the flight test conditions under sections B36.8 (or an approved equivalent procedure), stated under Appendix B of this part.

a. Explanation

This Section specifies 14CFR Part 36 requirements for an applicant to determine an airplane's reference noise levels.

b. Supplemental Information

(1) Appendix B: Appendix B prescribes that an applicant comply with the noise measurement and evaluation requirements of Appendix A (Section B36.1), a noise evaluation measure (EPNdB) (Section B36.2), test and reference noise measurement points (Sections B36.3 and B36.4), maximum noise levels for Stage 1, Stage 2, and Stage 3 airplanes (Section B36.5), tradeoffs (Section B36.6) and test and reference flight procedures (Sections B36.7 and B36.8).

(2) Noise Measurement Points: Test noise measurement points frequently do not coincide with the reference noise measurement point locations specified in Section B36.3. For example, locations of flyover noise measurement points may be subject to test site anomalies that would make it impractical to set up microphones at the reference locations. An applicant who has an approved equivalent procedure to measure airplane noise data for generation of NPD plots using the Flight Path Intercept method may select test noise measurement points (particularly the flyover point) so as to optimize the noise recording system signal-to-noise ratios.

(3) Equivalent Procedures: FAA is not authorized to approve equivalencies for reference procedures.

(4) Flight Test Guide: General approved flight test procedures, principles, methods and flight crew operational practices are included in AC 25-7, Flight Test Guide, (Ref. 3b).

54. § 36.103(b)

Type certification applications for subsonic transport category large airplanes and all subsonic jet airplanes must show that the noise levels of the airplane are no greater than the Stage 3 noise limits stated in section B36.5(c) of Appendix B of this part.

b. Supplemental Information

(1) Stage 3 Compliance: Transport category large airplanes and turbojet-powered airplanes, for which application for a type certificate was made on or after November 5, 1975, are required to show compliance with Stage 3 maximum noise levels including tradeoffs. (See Sections B36.5 and B36.6)

IV. SUBPART C--RESERVED

V. SUBPART D--NOISE LIMITS FOR SUPERSONIC TRANSPORT CATEGORY AIRPLANES

55. § 36.301 Noise limits: Concorde [Are not addressed in this AC]

56. § 36.301(a) [Are not addressed in this AC]

57. § 36.301(b) [Are not addressed in this AC]

VI. SUBPART E--[RESERVED]

VII. SUBPART F--PROPELLER-DRIVEN SMALL AIRPLANES AND PROPELLER-DRIVEN, COMMUTER CATEGORY AIRPLANES

58. § 36.501 Noise Limits [To be completed later]

59. § 36.501(a) [To be completed later]

60. § 36.501(b) [To be completed later]

61. § 36.501(c) [To be completed later]

VIII. SUBPART G--[RESERVED]

62. .-65 [RESERVED]

IX. SUBPART H--HELICOPTERS

66. § 36.801 Noise Measurement [To be completed later]

67. § 36.803 Noise Evaluation and Calculation [To be completed later]

68. § 36.805 Noise Limits [To be completed later]

69. § 36.805(a) [To be completed later]

70. § 36.801(b) [To be completed later]

71. § 36.805(c)

For helicopters for which application for issuance of an original type certificate in the primary, normal, transport, or restricted category is made on or after March 6, 1986, and which the FAA finds to be the first civil version of a helicopter that was designed and constructed for, and accepted for operational use by, an Armed Force of the United States or the U.S. Coast Guard on or before March 6, 1986, it must be shown that the noise levels of the helicopter are no greater than the noise limits for a change in type design as specified in section H36.305(a)(1)(ii) of Appendix H of this part for compliance demonstrated under appendix H of this part, or as specified in section J36.305 of appendix J of this part for compliance demonstrated under appendix J of this part. Subsequent civil versions of any such helicopter must meet the Stage 2 requirements.

a. Explanation

(1) Stage 1 helicopters: The provision applicable to a helicopter based on a military design is defined. Reference is included to Appendix J but the rule dos not provide “Stage 2 + 2 dB (SEL)” or “no noisier than the parent” akin to the limits under Appendix H provided in H36.305. Thus the noise compliance discussed is therefore essentially related to certification under the provision of Appendix H.

b. Supplement Information

(1) Stage 1 Helicopter: if § 36.805(c) applies, then the noise compliance will lead to the following:

a) The helicopter is demonstrated to be a Stage 2 helicopter: The trade provisions in § H36.305(b) may be used to demonstrate compliance with the Stage 2 noise level requirement. The certificated helicopter is not designated as a first civil version, instead the certificated helicopter is designated as a Stage 2 helicopter;

b) The helicopter is demonstrated to be a Stage 1 helicopter via the “Stage 2 + EPNdB” noise limits specified in § H36.305 (a)(1)(ii) and is consequently designated as the first civil version. The trade provisions in § H36.305(c) for a first civil version, or

c) The helicopter fails to demonstrate compliance with the (Stage 2 + 2) noise limits specified in § H36.305 (a)(1)(ii): The helicopter will be denied a type certificate until such time that the helicopter, modified as necessary, successfully demonstrates compliance with at least the requirements for a first civil version outlined above in outcome (b). The helicopter fails to demonstrate compliance if one or more of the demonstrated Appendix H noise levels exceeds the corresponding noise level limit or that flight procedure and the helicopter does not otherwise meet the Stage 2 limits (note: a helicopter may exceed the State 1 limit for a given flight procedure and yet achieve Stage 2 compliance through the use of tradeoffs).

(2) Change in Type Design: If the applicant has substantiated that a proposed change in type design (as designated in § 21.93) would be less noisy or no noisier than the (parent) first civil version helicopter, no further compliance with 14 CFR part 36 is required than that compliance required of the parent helicopter. The derivative helicopter remains a first civil version. The applicant can elect to: (1) carry forward the

parent's noise numbers to the rotorcraft flight manual of the derived version; or (2) voluntarily noise test the derivative helicopter in order to substantiate it's impossible lower noise certification levels. However, if the derivative helicopter is found to be a Stage 2 helicopter as a result of the voluntary noise test, and if the applicant chooses to certify the derivative helicopter as a Stage 2 helicopter, that derivative helicopter is no longer classified as a first civil version.

(3) Subsequent Civil Version: The § 36.805(c) requirement for a subsequent civil version applies only to a helicopter previously designated as a first civil version. A subsequent civil version (unless otherwise excepted under § 21.93(b)(4) from the acoustical change requirements) is: (a) any change in type design of the first civil version that would result in one or more of the noise certification levels of the subsequent civil version that are greater than the corresponding noise certification levels of the first civil version; or (b) any change in the first civil version that is sufficient to require a new type certificate (as provided in § 21.19). As specified in § 36.805(c), a subsequent civil version must comply with the Stage 2 noise limits.

72. § 36.805(d) [To be completed later]

X. SUBPARTS I--N [RESERVED]

73. –75 [RESERVED]

XI. SUBPART O--OPERATING LIMITATIONS AND INFORMATION

76. § 36.1501 Procedures, Noise Levels and Other Information

77. § 36.1501(a)

All procedures, weights, configurations, and other information or data employed for obtaining the certified noise levels prescribed by this part, including equivalent procedures used for flight, testing, and analysis, must be developed and approved. Noise levels achieved during type certification must be included in the approved airplane (rotorcraft) flight manual.

a. Explanation

This Section specifies various types of information that must be developed and approved in the course of an aircraft noise certification process.

b. Supplemental Information

Noise Certification Compliance Documentation: The following types of documentation may be required in implementation of an aircraft noise certification process.

(1) NOISE CERTIFICATION PLANS: Applicant noise certification plans should be provided to FAA in the early stages of an aircraft program and contain certain types of information including proposals for the methodology an applicant wants to use. These plans, when approved, establish an aircraft's noise certification basis under 14CFR Part 36. When an aircraft program involves agreements between FAA and foreign certificating authorities, these plans may specify an aircraft's noise certification basis under both 14CFR Part 36 and the noise regulation used by the foreign authority (e.g., ICAO Annex 16, Volume 1; JAR 36). An example would be aircraft certified under FAA/JAA Concurrent and Cooperative Programs (see Note).

Noise certification plans should include the following types of information:

(i) An overview of the contents of a forthcoming noise compliance demonstration plan and noise certification report

(ii) Description of applicable noise certification regulations and the tests, reports, data submittals and flight manual pages planned to complete an aircraft noise certification process

(iii) Description of conformity requirements

(iv) DER's and other cognizant personnel to be involved in the aircraft noise certification process

(v) Milestone schedule of key events

(vi) Miscellaneous information(e.g. acronyms, organizational codes, etc.)

Note: Concurrent and Cooperative programs are intended to establish (to the extent possible) commonality in compliance methods and reduce program costs. Commonality may be achieved by obtaining certificating authorities approval to use the most stringent requirements specified by the regulations involved, or by substantiating that the requirements of the regulations involved produce equivalent noise levels (in this case an applicant may choose a method of compliance from only one regulation)

(2) NOISE COMPLIANCE DEMONSTRATION PLANS (Aircraft Flight Test): Noise compliance demonstration plans contain the specific methodology (including equivalent procedures) by

which an applicant proposes to establish compliance of a specific aircraft configuration with applicable 14CFR Part 36 requirements. These plans should define the information, data, and procedures that an applicant proposes to comply with the requirements of Section B36.5 of Appendix B. When approved by FAA, flight tests specified in this plan are included as a part of the Type Inspection Authorization (TIA) used to fulfil requirements for TC, STC, and amended TC certification.

Noise compliance demonstration plans should include the following types of information:

(i)Introduction (Identify Applicable 14CFR Part 36 Requirements – Aircraft Noise Certification Basis)

(ii) Aircraft Description (Type, Model/Serial Numbers, Engines or Propellers and Serial Numbers, Engine Ratings, Engine Nacelle Acoustic Treatments, Aircraft Gross Dimensions (including propeller and/or rotor diameter), Engine and ILS Antenna Locations, Aircraft/Engine Conformity.

(iii) Noise Certification Methodology (Test Concepts and Equivalent Procedures - See Sections 1.3, 2, 3, 4, or 5 of the appended ICAO Technical Manual), Plans for Determining Engine Spooldown Characteristics and Airframe Noise, Aircraft /Engine Performance Substantiation, Estimated Reference Conditions including Airspeeds, Thrust Reduction Distances, Altitudes, Thrust/Power Settings, Determination of Reference Noise Levels and 90% Confidence Limits, and Flight Manual Format.

(iv) Test Description: Test Site Location and Characteristics (e.g. Topography , Ground Cover and Obstructions), Location of Noise Measurement Points, Weather Constraints, Aircraft Configuration including Flap Settings, Airbrake and Landing Gear Positions and Propeller pitch angles(if applicable), APU Operation, Conditions of Pneumatic Bleeds and Power /Take-Offs, Test Matrix , including Weights, Target Altitudes, Airspeeds, Engine Thrust/Power , and Test Tolerances

(v) Measurement Systems and Procedures including Calibration Procedures: (Noise, Weather, Time/Space Position, Aircraft/Engine Performance Equipment

(vi) Data Evaluation Systems (e.g., analyzer type and mode) and Procedures including Calibration and Data Processing (e.g., Approval status of data reduction software and version level), Adjustment and Normalization Procedures : (Noise, Weather, Time/Space Position, and Airplane Engine Performance.

(vii) Aircraft Certification Schedule, including Noise Certification and TC Dates. (Noise compliance plans should be submitted to FAA 60 days prior to start of testing. If new and novel equivalent procedures are proposed, or exemptions are required, then submittal of test plans earlier than 60 days prior to the start of testing may be necessary.)

(viii) References

(ix) A listing of <u>all</u> equivalent procedures utilized (e.g., flight path intercept method).

3. <u>NOISE COMPLIANCE DEMONSTRATION PLANS (Airplane Family)</u>: Noise certification of airplane families (derivative airplanes) often require FAA approval of Equivalent Procedures involving measurement and evaluation of static engine noise test data as described in Section 2.3 of the appended ICAO Technical Manual in addition to the information required by Sub-Section (2), above. These procedures include projection of static engine noise test data for development of flyover, lateral, and approach NPD plots that define differences between a flight datum (originally certified) airplane and a derived version (See Note 1). When use of static engine noise

data is proposed, test plans must also be submitted to FAA and either integrated into the basic noise compliance demonstration plan, or submitted to FAA as separate plans and referenced in the basic plan (See Note 2).

Static engine noise test plans should include the following information:

(i) Engine Description (Type/Model and Serial Numbers, Nacelle Acoustic Treatments, Engine Conformity Requirements)

(ii) Test Description (Test Facility, Engine Installation, Turbulence Control Screen Configuration, Weather Constraints, Noise/Weather Measurement Points, Bleed Schedules, Test Run Matrix and Sequence including Thrust/Power Settings and Test Tolerances)

(ii) Measurement Systems and Procedures including Calibration Procedures: (Noise, Weather, Engine Performance)

(iii) Data Evaluation Systems and Procedures including Calibration, Data Processing, Adjustment and Normalization Procedures (Noise, Weather, Engine Performance)

(v) Schedules (Static Noise Test, Noise Certification and TC dates)

(vi) References

(vii) A listing of all equivalent procedures utilized.

Notes:

(1) Separate static test plans may also be generated in cases where Applicants airplane families are anticipated but not yet formalized and there is opportunity to obtain static engine noise data (because of engine availability) for future noise certification applications.

4. NOISE COMPLIANCE DEMONSTRATION PLANS (Analytical Methods): For certain aircraft type design changes (e.g. weight/thrust ,airframe design changes and thrust cutback distances or minor changes in engine components or acoustical treatments), applicants may propose using Analytical Equivalent Procedures to derive noise increments to an aircraft's certificated noise levels (See Section 2.2, 3.2 or 5.13 of the appended ICAO Technical Manual as applicable to the type of aircraft being certificated) or to demonstrate "No Acoustical Change" between the original certificated aircraft and the derived version.

Noise compliance demonstration plans should include the following information:

(i) Aircraft Description (Type/Model, Engines or Propellers).

(ii) Description of Type Design Changes.

(iii) Noise Certification Methodology (Overall Concepts, Description/Substantiation of Analytical Equivalent Procedures or Methods of Assessment of "No Acoustical Change", Aircraft Reference Conditions, Determination of Reference Noise Levels and 90% Confidence Limits.

(iv) Aircraft Certification Schedules.

(v) References.

5. DER "RAW DATA" REPORTS: FAA Order 8110.37C, Chapter 2, Section 201(h) specifies that Acoustical Designated Engineering Representatives (DER's) may, within the limits of their authority (defined in their letter of appointment) and with prior FAA approval, witness noise certification tests conducted in accordance with FAA approved noise compliance demonstration plans.

In cases where tests are witnessed by DER'S, FAA may require the following information to validate that tests are being conducted in accordance with approved plans.

(i) Test Event Log (Includes Event Times and Conditions, Nominal Engine Powers and Power Stability, Atmospheric Conditions, Airspeeds and Deviations Relative to Target Speeds, Valid and Invalid Test Points (including reasons for Invalid Points).

(ii) Test Measurement Systems (Type/Model) and Measurement/Calibration Procedures.

(iii) Equipment Calibration Events and Results.

(iv) Equipment Failures, Malfunctions, Non-Standard Operations, Spurious Signals and Corrective Actions Taken.

(v) Report of test condition compliance with 14 CFR part 36 test site requirements.

(vi) Field Data (Samples of Measured and Corrected Noise Spectra, Noise/Weather/Time/Space Position/ Aircraft Performance Field Data and Data Adjustments, EPNdB Estimates, and DER notes).

(vii) Summary of Meetings.

(6) NOISE CERTIFICATION REPORTS: Noise certification reports must provide information, data, and procedures demonstrating compliance with the requirements of Section B36.5 of Appendix B and FAA approved noise certification demonstration plans.

(7) Noise Certification Reports (Aircraft Flight Test): These reports must include the following:

(i) Introduction (Identify Applicable 14 CFR Part 36 Requirements --Aircraft Noise Certification Basis

(ii) Aircraft Description (Type/Model/Serial Numbers, Engines or Propellers and Serial Numbers, Engine Ratings, Engine Nacelle Acoustical Treatments, Aircraft Gross Dimensions (including propeller and/or rotor diameter), Engine and ILS Antenna Locations, Aircraft/Engine Conformity Status, Reference Conditions (MTOW/MLW, Thrust (Power), Altitudes, Airspeeds, Takeoff Profiles)

(iii) Noise Certification Methodology : (Noise certification methodology elements of a noise certification demonstration compliance plan approved by FAA for the aircraft configuration that is being certified and the specific report Sections in which implementation of each element is addressed (See Notes 1 and 3))

(iv) Test Description (Test Site Location and Characteristics e.g. Topography , Ground Cover, and Obstructions, Location of Noise Measurement Points, Test Conditions for each Noise Test Point including Weather, Aircraft Configuration e.g. Flap, Airbrake, Landing Gear and CG positions and Propeller Pitch Angles if applicable, APU Operation, Conditions of Pneumatic Bleeds and Power Takeoffs, Aircraft Weights, Altitudes, Airspeeds, Engine Thrust/ Power, Engine Spooldown Test Points and Conditions, Airframe Noise Test Points and Conditions, and Valid and Invalid Test Points

(v) Measurement Systems and Procedures including Calibration Procedures: (noise, Weather, Time/Space Position, Aircraft/Engine Performance Equipment)

(vi) Data Evaluation Systems and Procedures including Calibration, Data Processing and Adjustment Procedures: (Noise , Weather, Time/Space Position, Aircraft/Engine performance)

(vii) Data Analysis and Normalization Results: (Analysis Results for Height of Maximum Lateral Noise, Thrust Reduction Distance, Airframe Noise Adjustments, Engine Spooldown Characteristics, Normalized Aircraft Data e.g. Noise , Power , Distance Plots, Reference Noise Levels, 90 % Confidence limits, and Aircraft Flight manual Pages)

(viii) If test witnessing is delegated, then the witness log or notes specified in section 5 above must be included.

(ix) References

(8) Noise Certification Reports (Airplane Family): Applicants noise certification reports involving airplane family concepts must include additional information on noise certification methodology and, if applicable, results of static engine noise tests as follows

(i) Noise Certification Methodology (Identify Approved Equivalent Procedures for Projection of Static Engine Noise Data to Flight Conditions in NPD Plot Format and Methods for defining: 1) NPD Plot differences between Flight Datum (Originally Certified Airplanes) and Derived Versions, and 2) " Residual" NPD Plot Differences between Flight Test Data and Projected Flight Data for the Originally Certified Airplane.

(ii) Static Engine Noise Test Results

a. Engine Description (Type/Model/Serial Number, Nacelle Acoustic Treatments, Engine Conformity Status)

b. Test Description (Test Facility, Engine Installation, Turbulence Control Screen, Noise/Weather Measurement Points, Bleed Schedules, Valid and Invalid test Points, Test Conditions for each Test Point (Weather, Engine Thrust(Power))

c. Measurement Systems and Procedures Including Calibration Procedures: (Noise, Weather and Engine Performance Equipment)

d. Data Evaluation Systems and Procedures including Calibration and Data Processing, Adjustment and Normalization Procedures: (Noise, Weather, and Engine Performance).

(9) EQUIVALENT PROCEDURES: Applicants Equivalent Procedures proposals must be included in aircraft noise compliance demonstration plans (See Note 1). Such proposals may involve new procedures or procedures that have been used previously. However, they must be applicable to the specific aircraft model for which a type certificate is requested (See Note 2). Equivalent Procedures must be substantiated to yield the same noise levels as procedures prescribed in 14CFR Part 36.

FAA Order 8110.4A, Section 53(e)(3) specifies AEE as the FAA approving authority for Equivalent Procedures (See Note 3). However, as experience is gained with the application of a particular procedure, AEE may delegate approval of the procedure to ACO or NCS specialists. (See FAA

AEE Memorandum " Required Approval Level for 14CFR Part 36 Subpart B and C Equivalent Procedures", dated August 19, 1998).

For example, FAA policy currently permits NCS approval (or ACO approval when authority is delegated) of NPD equivalencies representing extensions of data used to demonstrate compliance with 14 CFR Part 36 for original certified aircraft. NCS (or ACO) approval authority is limited to cases where either the NPD curve fit is linear and the proposed extension is not greater than 5 percent, or the NPD curve fit is 2nd order and the proposed extension is not greater than 2.5 percent. The Transport Aircraft Directorate NCS also has approval authority for use of existing NPD plots for amended type designs (excluding extrapolation and increments to NPD plots –See Note 7)

Although Equivalent Procedures are usually treated by FAA as proprietary property of an applicant, when several applicants propose closely related or similar procedures (e.g. flight path intercepts), they may be considered to be common industry knowledge and may be described in this FAA Advisory Circular and/or the appended ICAO Technical Manual (See Sections 2-6).

Notes:

1. Equivalent Procedure proposals must be submitted to FAA early in an aircraft noise certification program because approval may require time spans exceeding one year.

2. An applicant's capability to effectively implement the procedure should be assessed as well as the appropriateness of the procedure for the specific type of aircraft for which certification is requested.

3. FAA is not authorized to approve procedures equivalent to Reference Procedures (e.g., 3^{o} approach glide path) specified in 14CFR Part 36

4. Data obtained during noise certification tests may support extrapolation of noise databases (e.g. for engine power range extensions above and below what was tested). Guidance on extrapolation of NPD databases is provided in Section 2.2.2 of the appended ICAO Technical Manual. Engine or aircraft designs that may cause transition to sonic fan tip velocity; mid-span fan shrouds interaction; fan exit guide vane choking; surge bleed valve operation; stator vane interaction; choked primary compressor entrance; increased inlet bypass airflow; change in aircraft configuration interaction, etc., may change the nature of the noise signature of the engine or aircraft and prevent an ordered extension of noise data. Static engine noise tests may not provide adequate proof that an extension of the noise database is valid. Guidance on generating increments to NPD databases is presented in Section 2.2.2 (c) of the appended ICAO Technical Manual based upon development of analytical noise models validated by certificating authorities.

(10) NO ACOUSTICAL CHANGE DOCUMENTATION: Aircraft type design changes that are categorized as " No Acoustical Change" require FAA approval under the provisions of 14 CFR Part 21 rather than 14 CFR Part 36. Applicants' proposals for approval of "No Acoustical Change" should consist of a letter submitted to FAA defining what changes in aircraft type design are planned. This letter should be accompanied by information, data and analyses that will substantiate that the specified type design change will not result in an "Acoustical Change" (See Subpart A, Section 36.1 (c), Supplemental Information (2).

Note: Acoustic changes are determined by individual aircraft, not aircraft model. 14 CFR part 21.93(b) states that, "…any voluntary change in the type design of an aircraft that may increase the noise levels of that aircraft is an 'acoustic change'." Therefore acoustic change is determined on an

aircraft by aircraft basis and cannot solely rely on the type certificate data sheet (TCDS) information for the aircraft model.

The substantiation documentation should include:

(i) Introduction (Concepts and Requirements)

(ii) Description of Aircraft Baseline and Proposed Type Design Changes

(iii) Methodology for Substantiating “no Acoustical Change”

(iv) Description of Tests and/or Analyses performed

(v) Test and/or Analyses Results Relating to Compliance with FAA ‘ No Acoustic Change Criteria” (See Subpart 1 Section 36.1 (c) Supplemental Information Item 2)

(vi) As noted in 14 CFR part 189.29(i), no acoustic DER may determine that a type design change is not an acoustic change. An acoustic DER may develop the substantiation for a NAC finding, but the FAA must make the finding. Therefore, the acoustic DER should not submit the substantiation under form 8110-3.

(11) OTHER NOISE RELATED DOCUMENTATION: FAA is required to develop noise related documentation other than that required for applicants under 14CFR Part 36, Subpart O, Section 1501 as follows:

a. FINDINGS REQUIRED BY PUBLIC LAW 103-272 DATED JULY 5,1994 (Supercedes Noise Control Act of 1972): Compliance with Public Law 103-272 requires that FAA, before issuing an original TC for any aircraft of any category, regardless of whether 14 CFR Part 36 applies to the aircraft, must make a finding to determine whether:

(i) Substantial noise abatement cannot be achieved for that aircraft by prescribing standards and regulations consistent with the limitations of Section 44715(b); or

(ii) Substantial noise abatement may be so achieved in which case the regulatory process must be used to determine the extent of noise reduction to be required before an original TC may be issued.

Note: The specific process required for FAA to complete Noise Finding documentation is presented in FAA Order 8110.4A, dated March 2, 1995, paragraph 53c, (2), (3) (a-e).

b. ENVIRONMENTAL ASSESSMENTS: Compliance with the National Environmental Policy Act of 1969 may require that the FAA conduct an Environmental Assessment (EA) as specified in Appendix 4, Section 3(a) of FAA Order 1050.1D dated December 5, 1986. An EA is conducted when type certificate actions (New, Amended, or Supplemental) are initiated for aircraft types for which 14CFR Part 36 requirements do not exist (See Note 1). An Environmental Impact Statement (EIS) or Finding of No Significant Impact (FONSI) must be prepared (See Note 2). FAA may grant an interim aircraft noise certification upon completion of an EA while appropriate rulemaking is being completed.

Notes:

1. Applicants may be requested to provide appropriate noise data to FAA to support the EA and/or rulemaking processes

2. Procedures for generation of an EA ,EIS or FONSI are also found in FAA Order 1050.1D

(c) Procedures:

(1) Applicant's Responsibility: Applicants are responsible to generate and submit to FAA the following noise certification documentation:

a. Noise Certification Plans.

b. Noise Compliance Demonstration Plans (Including Proposed Equivalent Procedures)

c. Noise Certification Reports

d. No Acoustical Change Substantiation

(2) Acoustic Designated Engineering Representative (DER) Responsibility: Acoustic DER'S responsibilities are as defined in FAA Order 8110.37C , dated September 30, 1998

(3) FAA Responsibility: FAA is responsible to review and approve all noise certification documentation except that which might be delegated for approval by Designated Engineering Representatives. They are also responsible to generate Findings required by Public Law 103-272, dated July 5, 1994 and Environmental Assessments, Environmental Impact Statements or Finding of No Significant Impact as specified in FAA Order 1050.1D, dated December 5, 1986.

78. § 36.1501(b)

Where supplemental test data are approved for modification or extension of an existing flight data base, such as acoustic data from engine static tests used in the certification of acoustical changes, the test procedures, physical configuration, and other information and procedures that are employed for obtaining the supplemental data must be developed and approved.

a. Explanation

FAA permits use of non-flight test data to supplement flight databases and to allow wider flexibility in the use of that data for aircraft modifications and extension of flight test data. This includes static engine noise be used to modify or expand NPD databases for noise certification of derivative airplanes.

b. Supplemental Information

(1) Airplane Families: Section 2.3 of the appended ICAO Technical Manual presents guidance on static engine noise tests and projection of static engine noise data to flight conditions. Comparisons of projections of static engine noise data from the engines of an originally certified airplane with that of modified configuration engines can permit acceptable re-evaluation of certificated noise levels without further expensive and time consuming flight tests. An originally certified airplane and its derivatives are known as an "Airplane Family". Equivalent procedures for determining the noise levels of derivative airplanes must be submitted to the FAA for approval.

c. Procedures

(1) Tests For Supplemental Data: An applicant should attempt to obtain static engine or flight test noise data at engine power settings and ranges, and airplane flight configurations and conditions that may be needed in the foreseeable future. This may necessitate over-boosting of the engine power (with the permission of the engine manufacturer), resetting of the engine idle power to lower

limits, testing to higher or lower range of airspeed and angles of attack, testing at higher or lower altitudes, etc.

79. § 36.1581 Manuals, markings, and placards

80. § 36.1581(a)

If an Airplane Flight Manual or Rotorcraft Flight Manual is approved, the approved portion of the Airplane Flight Manual or Rotorcraft Flight Manual must contain the following information, in addition to that specified under Sec. 36.1583 of this part. If an Airplane Flight Manual or Rotorcraft Flight Manual is not approved, the procedures and information must be furnished in any combination of approved manual material, markings, and placards.

(1) For transport category large airplanes and turbojet powered airplanes, the noise level information must be one value for each flyover, lateral, and approach as defined and required by Appendix C of this part, along with the maximum takeoff weight, maximum landing weight, and configuration.

(2) For propeller driven small airplanes the noise level information must be one value for flyover as defined and required by Appendix F (or Appendix G) of this part, along with the maximum takeoff weight and configuration.

(3) For rotorcraft the noise level information must be one value for flyover, lateral and approach as defined and required by Appendix H (or flyover for Appendix J) along with the maximum takeoff weight, maximum landing weight and configuration.

a. Explanation

This Section specifies information that must be contained in airplane and rotorcraft flight manuals.

b. Supplemental Information

(1) An approved Airplane Flight Manual (AFM) or Rotorcraft Flight Manual (RFM) is required for certification of each aircraft type in compliance with Section 1581 of the Airworthiness Standards for 14CFR Parts 23, 25, 27, and 29. Section 1581 of 14CFR Part 36 requires that certificated noise level compliance information be included in the AFM or RFM. These levels must be contained in an FAA approved section of the AFM or RFM other than the limitations section. For example, the performance section is an appropriate place to include the certificated noise level compliance information. The certificated noise levels are to be reported to 0.1 dB in the AFM or RFM. Further, an AFM or RFM must specify the type certificate limits, if any, that are established as a result of 14 CFR Part 36 compliance when combined with the airworthiness limitations.

(2) Airplane Flight Manual Limitation Section:

a) An AFM may be issued for a single aircraft or a group of similar aircraft (including more than one series of a specific model). The AFM must clearly identify (by airplane serial number) the operating limitations, including the maximum weight limits that apply to an airplane.

b) The AFM may address a single configuration (hardware build) or multiple configurations. If an AFM includes information for more than one configuration (hardware build), the appropriate airplane operating limitations must be clearly identified for each configuration. Furthermore, if not all configurations are approved for the airplanes listed in the AFM, the AFM must clearly identify by serial number, the proper operating limits for each airplane.

c) The operating limitations contained in the Limitations Section (including any noise-limited weights) must be expressed in mandatory language, not permissive language. The terminology used in the AFM must be consistent with the relevant regulatory language.

(3) Multiple Airplane Noise Certifications

(a) Multiple noise-limited gross weight pairs (takeoff and landing) for one airplane configuration are not permitted by Subpart A, Section 36.1 (g) as compliance with 14CFR Part 36. Only one set of gross weight limits that pertain to a particular configuration (hardware build) may be established under Part 36 for a particular airplane.

(b) An airplane configuration (hardware build) must be certificated to only a single "Stage" as appropriate under Part 36 (Stage 1, Stage 2, or Stage 3). The limitations Section of the AFM for an airplane configuration must not contain operating limits that would result in noise levels exceeding 14CFR Part 36 noise limits. However, "Stage, 2" airplanes may be recertificated as "Stage 3", provided AFM's are revised and approved for configurations appropriate for compliance with "Stage 3", and the "Stage 2" approval is deleted.

(4) Landing Flap Restriction

a) An operating limitation preventing the use of an approved landing flap setting cannot be imposed under 14 CFR Part 36 and must be established under airworthiness requirements or a voluntary design change. If such a restriction is requested by an applicant in order to comply with 14 CFR Part 36 certification requirements, that flap setting may be incorporated in the AFM Limitations section and operational information may be included in the Emergency Procedures Section.

b) For airworthiness purposes, some airplane models have a "softguard," which makes it obvious that the maximum flap setting is not to be used for normal operation and would indicate any use of the unapproved setting by its deformation. This policy is also required by the Transport Category Directorate on all Stage 3 airplanes that fail to comply with the provisions of 14CFR Part 36 in the "noisiest" landing flap configuration. This is particularly important for STC projects where the basic AFM may not be modified, only supplemented, allowing the unapproved maximum flap performance information to remain intact and available.

c. Procedures

(1) Applicant Responsibility: An applicant must identify limiting configurations that may be required to satisfy airworthiness and/or noise regulatory requirements. The limiting configurations - including approved aircraft gross weights - are identified in the "Limitation Sections" of the approved aircraft flight manual (AFM or RFM).

(2) Implementation of Landing Flap Restrictions.

a. Where permitted, remove the performance information that is relevant to the unapproved flap setting from the Performance Section of the AFM. (Note that supplemental type certificate (STC) applicants are not authorized to modify the basic AFM.)

b. If the "unapproved" flap setting remains selectable:

i) State in the Limitations Section of the AFM that the unapproved flap setting cannot be used except for emergencies.
ii) Place appropriate placards in the cockpit to prevent use of the restricted flap setting.

iii) For Stage 3 airplanes, provide a “softguard,” such as a crushable cover plate, over the slot in which the flap selector handle travels, to restrain normal use of the unapproved flap setting.

(3) Placards and Soft-guards: Where an operational hardware configuration results in a changed or limiting operational configuration in order to demonstrate compliance with 14CFR Part 36 noise limits (such as a reduced flap position limit), the hardware notification is to be placarded in view of the flight crew and a hardware soft-guard should be installed for easy inspection. Any soft-guard can only be broken in a declared emergency and a broken soft-guard must be repaired by appropriate 14CFR Part 43 maintenance action prior to the next flight. All operational limitations are to be identified in the “Limitation” section of the AFM.

(4) Hard-guards: A hard-guard may be proposed or provided by the applicant as a of the type design to physically limit the selection of certain operational configurations. As an alternative to a soft-guard and placard installation, the applicant may design a hard-guard installation in order to comply with the noise certification requirements of this Part. The FAA will not propose or require a hard-guard installation, but will approve a hard guard installation when it can be demonstrated that the installation complies with all applicable airworthiness regulations.

(5) ICAO Certifications: FAA does not grant approval of Annex 16 noise levels. This is the responsibility of the foreign airworthiness authority involved. FAA participation is limited to witnessing tests and reviewing data. In those cases where Stage 3 has been demonstrated, it is permissible to insert the following statement in the AFM:

“Certification Noise Levels

The following noise levels comply with 14 CFR Part 36, Appendix C, Stage 3 noise level requirements and were obtained by analysis of approved data from noise tests conducted under the provisions of 14 CFR Part 36, Amendment(Applicable on the date of 14 CFR Part 36 certification). The test and analysis procedures used to obtain these noise levels are essentially equivalent to those required by the International Civil Aviation Organization (ICAO) in Annex 16, Volume I, Chapter 3.ICAO Annex 16, Volume I, Chapter 3 approval is applicable only after endorsement by the Civil Aviation Authority of the country of airplane registration.”

81. § 36.1581(b)

If supplemental operational noise level information is included in the approved portion of the Airplane Flight Manual, it must be segregated, identified as information in addition to the certificated noise levels, and clearly distinguished from the information required under Sec. 36.1581(a).

a. Explanation

This Section specifies requirements for including supplemental noise level information in an approved AFM.

b. Supplemental Information

(1) The FAA permits publication of supplemental noise information in an approved AFM or RFM for configurations other than those for the maximum takeoff and landing weights or reduced landing flap operation, APU Off etc.

(2) Operational Configurations: Airlines may voluntarily select various airplane configurations to suit their operational route structures and airport operational requirements. However, these configurations must be within the limiting certification configurations that were used to determine

compliance with 14 CFR Part 36 noise limits. The certification noise levels that were used to demonstrate noise limit compliance are to be identified in the AFM.

c. Procedures

(1) Applicant's Responsibility: Applicant's must identify supplemental noise levels as "Supplemental Information" when they are included in an AFM or RFM. Even though noise data used to provide "Supplemental Information" may have bee obtained during certification noise testing and witnessed by FAA, it still must be clearly marked to show that it is not intended to demonstrate compliance with 14 CFR Part 36.

(2) FAA Responsibility: FAA must verify that supplemental noise information is clearly identified and is not confused with certificated noise levels.

82. § 36.1581(c)

The following statement must be furnished near the listed noise levels:

No determination has been made by the Federal Aviation Administration that the noise levels of this aircraft are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

a. Explanation

This Section specifies that the FAA does not appraise aircraft in terms of their index of acceptability as related to airport operations.

b. Supplemental Information

(1) Certification vs. Operational Rule: 14 CFR Part 36 is a certification rule and not an operational rule. The certificated noise levels may or may not meet the operational noise level requirements at any particular airport. The aircraft noise certification provisions of 14 CFR Part 36 do not place any operational permissibility or limitations on the operation of certificated aircraft at any airport.

c. Procedures

(1) Applicant's Responsibility: Applicants are responsible to develop an AFM or RFM and obtain FAA approval prior to the aircraft entering service. The approved flight manual must list the certificated noise levels shown to comply with 14CFR Part 36 noise level limits and contain a disclaimer as specified in Section 36.1581(c).

83. § 36.1581(d)

For transport category large airplanes and turbojet powered airplanes, for which the weight used in meeting the takeoff or landing noise requirements of this part is less than the maximum weight established under the applicable airworthiness requirements, those lesser weights must be furnished, as operating limitations in the operating limitations section of the Airplane Flight Manual. Further, the maximum takeoff weight must not exceed the takeoff weight that is most critical from a takeoff noise standpoint.

b. Supplemental Information

(1) Maximum Airworthiness Gross Weights: Transport category and turbojet powered airplane gross weights are normally limited for structural, performance or economic reasons and demonstrated to the appropriate airworthiness standards for the airplane. Those airworthiness limited gross weights may constitute the maximum operational gross weights and are to be identified in the "Limitation Section" of an approved AFM.

(2) Approach Noise Limiting Configurations: Applicants may need to limit the landing flaps or the approach gross weight in order to comply with the requirements of 14 CFR Part 36. All noise limiting gross weights and configurations are to be furnished in the "Limitations Section" of an approved AFM

(3) Takeoff Noise Limiting Configurations: An applicant may establish takeoff limiting configurations (e.g., maximum takeoff gross weight, takeoff airspeed schedules, takeoff power derate schedule, in-flight APU operation) that are more restrictive than the airworthiness limited configurations. These noise limited configurations are to be furnished in the "Limitations" section of an approved AFM.

(4) Optional Engine Thrust Ratings (Derate and Reduced Thrust): Compliance with 14CFR Part 36 is only required at full rated takeoff thrust. However, an airplane may be type certificated at derated/reduced that is less than full rated takeoff thrust. Derated/reduced thrust is not an acoustical change as defined in 14CFR Part 21 Section 21.93 (b) provided that the full rated thrust remains approved for a given airplane configuration. Airplane type certification at derated/reduced thrust does not prohibit an applicant from employing thrust reduction for noise certification as permitted by Section C36.7 (b) of Appendix C.

84. § 36.1581(e)

For propeller driven small airplanes and for Propeller-driven commuter category airplanes for which the weight used in meeting the flyover noise requirements of this part is less than the maximum weight by an amount exceeding the amount of fuel needed to conduct the test, that lesser weight must be furnished, as an operating limitation, in the operating limitations section of an approved Airplane Flight Manual, in approved manual material, or on an approved placard.

85. § 36.1581(f)

For primary, normal, transport and restricted category helicopters, if the weight used in meeting the flyover, lateral , or approach noise requirements of Appendix H of this part, or the weight used in meeting the flyover noise requirement of Appendix J of this part, is less than the certificated maximum takeoff weight established under either § 27.25 (a) or § 29.25 (a) of this chapter, that lesser weight must be furnished as an operating limitation in the operating limitations section of the Rotorcraft Flight Manual, in FAA-approved manual material, or on an FAA approved placard.

86. § 36.1581(g)

Except as provided in paragraphs (d), (e), and (f) of this section, no operating limitations are furnished under this part.

87. § 36.1583 Noncomplying Agricultural and Fire Fighting Airplanes

a. Explanation

This Section specifies that certain classes of airplanes that are exempt from the noise certification requirements of 14 CFR Part 36.

88. § 36.1583(a)

This section applies to propeller-driven, small airplanes that--

(1) Are designed for "agricultural aircraft operations" (as defined in Sec. 137.3 of this chapter, effective on January 1, 1966) or for dispensing fire fighting materials; and
(2) Have not been shown to comply with the noise levels prescribed under Appendix F of this part--
iI) For which application is made for the original issue of a standard airworthiness certificate and that do not have any flight time before January 1, 1980, or
(ii) For which application is made for an acoustical change*(2)* ***approval, for airplanes which have a standard airworthiness certificate after the change in the type design, and that do not have any flight time in the change*** configuration before January 1, 1980.

a. Explanation

This section specifies the noise certification limitations and exemptions for propeller-driven, small airplanes that are specifically designed for agricultural aircraft operations and for dispensing fire fighting materials.

b. Supplemental Information

(1) Small Airplanes: Small airplanes are those of 12,500 pounds (5,670 Kg) or less maximum certificated takeoff weight.

(2) Fire Fighting Airplanes: Fire fighting airplanes are not exempt from the noise certification requirements of 14CFR Part 36. Those small propeller-driven airplanes that are specifically designed for “dispensing of fire fighting materials" are exempt from the noise certification requirements of 14CFR Part 36

(3) Agricultural Airplane Operations: Agricultural aircraft operation, as defined in 14 CFR Part 137.3, means the operation of an aircraft for the purpose of:

(i) dispensing any economic poison, or
(ii) dispensing any other substance intended for plant nourishment, soil treatment, propagation of plant life, or pest control, or
(iii) engaging in dispensing activities directly affecting agriculture, horticulture, or forest preservation, but not including the dispensing of live insects.

(4) Economic Poisons: Economic poisons, as defined in 14 CFR Part 137.3, means:

(i) any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any insects, rodents, nematodes, fungi, weeds, and other forms of plant or animal life or viruses, except viruses on or in living man or other animals, which the Secretary of Agriculture shall declare to be a pest, and
(ii) any substance or mixture of substances intended for use as a plant regulator, defoliant or desiccant.

89. § 36.1583(b)

For airplanes covered by this section an operating limitation reading as follows must be furnished in the manner prescribed in Sec. 36.1581:

Noise abatement: This airplane has not been shown to comply with the noise limits in 14 CFR Part 36 and must be operated in accordance with the noise operating limitation prescribed under FAR Sec. 91.815.

a. Explanation

This section specifies an operating limitation that is to be included in an AFM for propeller-driven, small airplanes that are designed for agricultural operations and for dispensing fire fighting materials.

b. Supplemental Information

(1) Limitation on Operations: No person may operate, in accordance with the restrictions of 14 CFR §91.815, an airplane that complies with the noise certification exemptions of this section, except:

(i) to accomplish the work activity directly associated with the purpose for which it is designed, and
(ii) to provide flight crewmember training in the special purpose operation for which the airplane is designed, and
(iii) to conduct “nondispensing aerial work operations” related to agriculture, horticulture, or forest preservations.

90. –99 [RESERVED]

91. –99 [RESERVED]